

Nigrostriatal Pathway (Dopaminergic)



PLAY PICMONIC

Dopamine Pathway

Doberman Pathway

The nigrostriatal pathway is one of the four dopaminergic pathways involved in the release of dopamine.

Location

Substantia Nigra

Substantial Knight

The nigrostriatal pathway begins at the substantia nigra of the midbrain.

Striatum

Striped-ribbon

The nigrostriatal pathway ends at the striatum, specifically involving the putamen and caudate nucleus of the basal ganglia.

Characteristic

Motor Function

Motor

The nigrostriatal pathway is responsible for controlling the motor functioning of the body.

Direct Pathway

Direct-route

The nigrostriatal pathway involves the basal ganglia, which is responsible for both the direct and indirect pathways of movement. The direct (excitatory) pathway begins in the cortex and *excites* the striatum (D1 receptor). The striatum then *inhibits* the substantia nigra. Normally, the substantia nigra *inhibits* excitatory structures. However, if the substantia nigra is inhibited, the thalamus is free to send **excitatory** input to the motor cortex, which leads to **increased** movement. Thus, the overall input of the direct pathway is **excitatory**.

Indirect Pathway

Indirect-route

The nigrostriatal pathway involves the basal ganglia, which is responsible for both the direct and indirect pathways of movement. The first indirect (inhibitory) pathway begins in the cortex and *excites* the striatum. The striatum then *inhibits* the subthalamic nucleus, which sends excitatory signals to the substantia nigra. The substantia nigra is then free to *inhibit* the thalamus, an excitatory structure. With the thalamus inhibited, **excitatory** signals cannot be sent to the motor cortex, which leads to **decreased** movement. Thus, the overall input of the indirect pathway is **inhibitory**. However, the second pathway involves the striatum stimulating the substantia nigra, acting on D2 receptors, which then *inhibits* the subthalamic nucleus. The inhibition of the subthalamic nucleus then allows **excitatory** signals from the thalamus to proceed to the motor cortex, resulting in **increased** movement.

Defect

Extrapyramidal Symptoms

X-Pyramid

If there is a defect of the nigrostriatal pathway, it leads to the presentation of extrapyramidal symptoms. In the case of inhibition, this can involve a type of pseudoparkinsonism. If instead stimulated, this can involve chorea.